

Claims

- [c1] 1.A power source for providing remote electrical power comprising:
- a transportable housing;
 - an engine arranged within the transportable housing;
 - an energy storage device disposed within the housing to provide an output power of the power source;
 - a generator configured to be driven by the engine, disposed within the transportable housing, and arranged in rechargeable association with the energy storage device;
 - a switchable electrical configuration arranged to switch delivery of output power between the generator and the energy storage device; and
 - a controller configured to automatically switch the switchable electrical configuration to deliver the output power of the power source from one of: the generator, the energy storage device, and a combination of the generator and the energy storage device.
- [c2] 2.The power source of claim 1 wherein the controller is configured to only switch the switchable electrical configuration of the power source to provide the output power of the power source from the generator upon de-

tection of a power indication of the energy storage device falling below a predetermined threshold.

[c3] 3.The power source of claim 2 wherein the power indicator includes at least one of a current indicator, a voltage indicator, and a power indicator of the energy storage device.

[c4] 4.The power source of claim 1 wherein the engine is configured to begin operation to charge the energy storage device upon energy depletion of the energy storage device below a threshold.

[c5] 5.The power source of claim 1 wherein the controller is configured to deliver the output power of the power source from the energy storage device and automatically switch the switchable electrical configuration to deliver the output power of the power source from the generator upon detecting output power from the generator above a desired threshold.

[c6] 6.The power source of claim 5 wherein the generator is configured to charge the energy storage device intermittently while the energy storage device provides the output power of the power source.

[c7] 7.The power source of claim 5 wherein the engine and generator are configured to charge the energy storage

device automatically based upon an output power demand.

[c8] 8.The power source of claim 1 wherein the controller is further configured to automatically switch the switchable electrical configuration of the power source to provide the output power of the power source from the energy storage device during a first operational period and from the generator during a second operational period.

[c9] 9.The power source of claim 8 wherein the first operational period is a startup period of the generator and wherein the second operational period is a post-startup period of the generator.

[c10] 10.The power source of claim 8 wherein the controller is configured to automatically switch the switchable electrical configuration of the power source without interrupting the output power of the power source.

[c11] 11.The power source of claim 1 wherein the generator is configured to provide a charging power to the energy storage device.

[c12] 12.The power source of claim 11 wherein the generator is configured to also provide the output power of the power source.

- [c13] 13.The power source of claim 11 wherein the generator is configured to exclusively deliver the charging power to the energy storage device.
- [c14] 14.The power source of claim 1 further comprising a sensor configured to detect a signal delivered by the generator and provide feedback to a controller configured to control the switchable electrical configuration of the power source.
- [c15] 15.The power source of claim 14 wherein the controller is further configured to automatically switch the switchable electrical configuration of the power source to deliver the output power of the power source from the generator upon receiving a signal from the sensor indicative of post-startup generator operation.
- [c16] 16.The power source of claim 1 wherein the controller is configured to cause the generator to recharge the energy storage device only after the output power of the power source drops below an output threshold.
- [c17] 17.The power source of claim 16 wherein the output threshold is zero.
- [c18] 18.A method of portably providing remote electrical power comprising the steps of:
initiating a power delivery from an energy storage device

disposed within a portable housing;
starting a fossil fuel driven engine power source disposed within the portable housing; and
upon an energy level of the energy storage device reaching a lower threshold, automatically switching the power delivery from the energy storage device to the fossil fuel driven engine power source.

[c19] 19.The method of claim 18 wherein the step of initiating the power delivery from the energy storage device and the step of starting of the fossil fuel driven engine power source occur substantially simultaneously.

[c20] 20.The method of claim 18 further comprising the step of charging the energy storage device from the fossil fuel driven engine power source until the battery reaches an upper threshold.

[c21] 21.The method of claim 18 wherein the fossil fuel driven engine power source is configured to also be operable by consuming alternative fuels.

[c22] 22.The method of claim 18 further comprising the steps of monitoring power delivery and upon detecting a break in the power delivery, automatically disabling the fossil fuel driven engine power source.

[c23] 23.The method of claim 18 further comprising the step

of autonomously performing the power delivery from one of the energy storage device and the fossil fuel driven engine power source.

[c24] 24.The method of claim 18 further comprising the step of charging the energy storage device from the fossil fuel driven engine power source upon detecting the energy level of the energy storage device reaching another lower threshold.

[c25] 25.An aircraft ground power apparatus comprising:
an engine driven power source configured to generate electrical power;
an energy storage device connected to the engine driven power source and configured to directly power an idle aircraft alternately with the engine driven power source.

[c26] 26.The aircraft ground power apparatus of claim 25 further comprising a portable housing and wherein the engine driven power source and the energy storage device are disposed substantially within the housing.

[c27] 27.The apparatus of claim 25 further comprising a power source controller configured to selectively power the aircraft from at least one of the engine driven power source and the energy storage device.

[c28] 28.The apparatus of claim 27 wherein the power source

controller is configured to switch an electrical configuration of the aircraft ground power apparatus to power the aircraft from the energy storage device during an initialization period and from the engine driven power source during a post-initialization period.

[c29] 29. The apparatus of claim 28 wherein the initialization period includes an engine start-up period of the engine driven power source.

[c30] 30. The apparatus of claim 28 wherein the power source controller is configured to automatically switch the electrical configuration of the aircraft ground power apparatus without interrupting the power to the aircraft.

[c31] 31. The apparatus of claim 27 further comprising a sensor configured to detect a signal indicative of an output delivered by the engine driven power source.

[c32] 32. The apparatus of claim 31 wherein the power source controller is configured to receive feedback from the sensor and to switch an electrical configuration of the aircraft ground power apparatus to power the aircraft from the engine driven power source upon receiving feedback from the sensor.

[c33] 33. The apparatus of claim 27 wherein the engine driven power source includes an engine configured to drive a

generator during operation and wherein the power source controller is configured to cease operation of the engine upon detecting a break in aircraft powering.

[c34] 34.The apparatus of claim 33 wherein the engine driven power source is configured to supply electrical power to deliver a charging power to the energy storage device during operation of the engine.

[c35] 35.The apparatus of claim 27 wherein the power source controller is configured to power the aircraft from the energy storage device and to switch an electrical configuration of the aircraft ground power apparatus to power the aircraft from the engine driven power source upon detecting a voltage drop of the energy storage device below a threshold.

[c36] 36.The apparatus of claim 25 wherein the engine driven power source is configured to charge the energy storage device during a break in powering the aircraft.

[c37] 37.The apparatus of claim 25 wherein the energy storage device is configured to power the aircraft and the engine driven power source is configured to charge the energy storage device.

[c38] 38.The apparatus of claim 27 wherein the engine driven power source and energy storage device are configured

to deliver a power output auxiliary to an aircraft power output.

- [c39] 39. An aircraft ground power device comprising:
a housing;
a generator disposed in the housing and configured to deliver power; and
an energy storage device rechargeably connected to the generator and configured to power an aircraft over a given duration.
- [c40] 40. The aircraft ground power device of claim 39 wherein the generator is further configured to deliver a power auxiliary to the power to the aircraft.
- [c41] 41. The aircraft ground power device of claim 39 wherein the generator is configured to power the aircraft upon an expiration of the given duration.
- [c42] 42. The aircraft ground power device claim 33 wherein generator and the energy storage device are configured to power the aircraft substantially simultaneously upon connection to the aircraft.
- [c43] 43. The aircraft ground power device of claim 39 wherein the energy storage device is disposed within the housing.

- [c44] 44.The aircraft ground power device of claim 39 further comprising a controller configured to switch an electrical configuration of the aircraft ground power device to deliver power from one of the generator and the energy storage device to power the aircraft.
- [c45] 45.A method of providing aircraft ground power comprising:
powering an aircraft from an energy storage device of an aircraft ground power unit; and
powering the aircraft from a generator of the aircraft ground power unit alternately with the energy storage device.
- [c46] 46.The method of claim 45 further comprising only powering the aircraft from the generator of the aircraft ground power unit if a voltage of the energy storage device of the aircraft ground unit is below a threshold.
- [c47] 47.The method of claim 45 further comprising recharging the energy storage device from the generator.
- [c48] 48.The method of claim 45 further comprising monitoring a power requirement of the aircraft and upon detecting a power requirement of the aircraft below a threshold, automatically disabling the generator.